

# National Personal Protective Technology Laboratory Self-Contained Self-Rescuer Capacity

Nicholas Kyriazi  
Biomedical Engineer  
Technology Evaluation Branch

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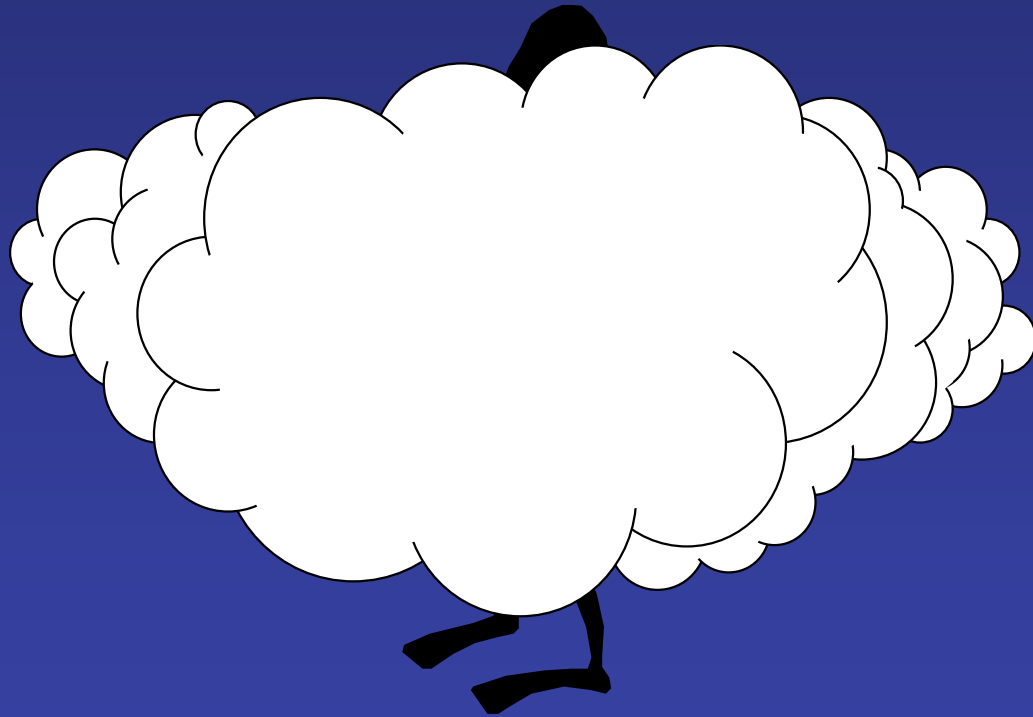
# OMB Disclaimer

- *“The findings and conclusions in this presentation\ have not been formally disseminated by the National Institute for Occupational Safety and Health and should not be construed to represent any agency determination or policy.”*

# MSHA 30 CFR 75.1714

- Each operator shall make available to each miner who goes underground, and to visitors authorized to enter the mine by the operator, an approved self-rescue device which is adequate to protect such person for one hour or longer.

SCSRs provide for your  
breathing needs when the air  
around you is unbreathable

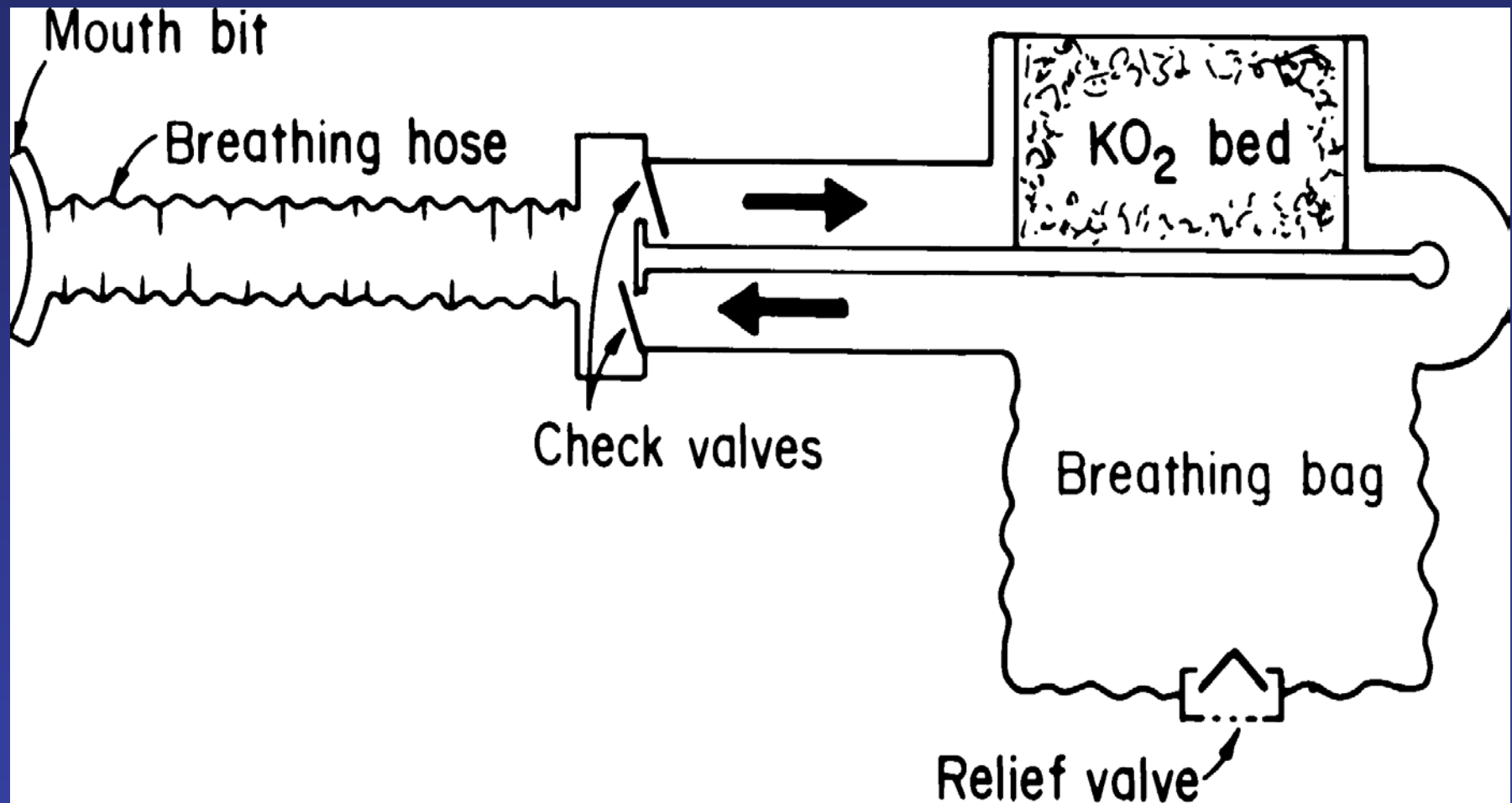


- **When you take a breath of air into your lungs, you use up the oxygen and replace it with carbon dioxide**

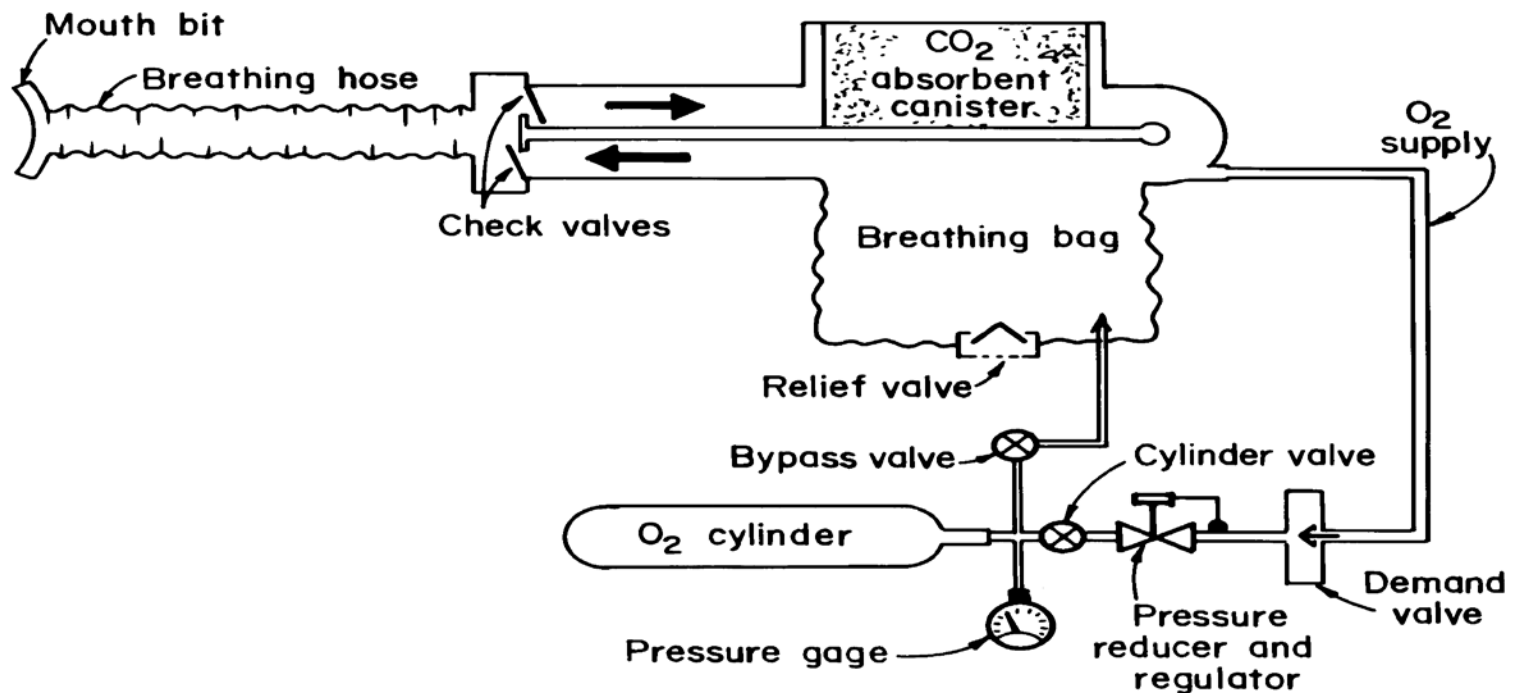
# What happens if you breathe in and out of a plastic bag?

- **Oxygen decreases**
- **Carbon dioxide increases**

# Typical Chemical Oxygen Self-Rescuer



# Typical Compressed-Oxygen Self-Rescuer



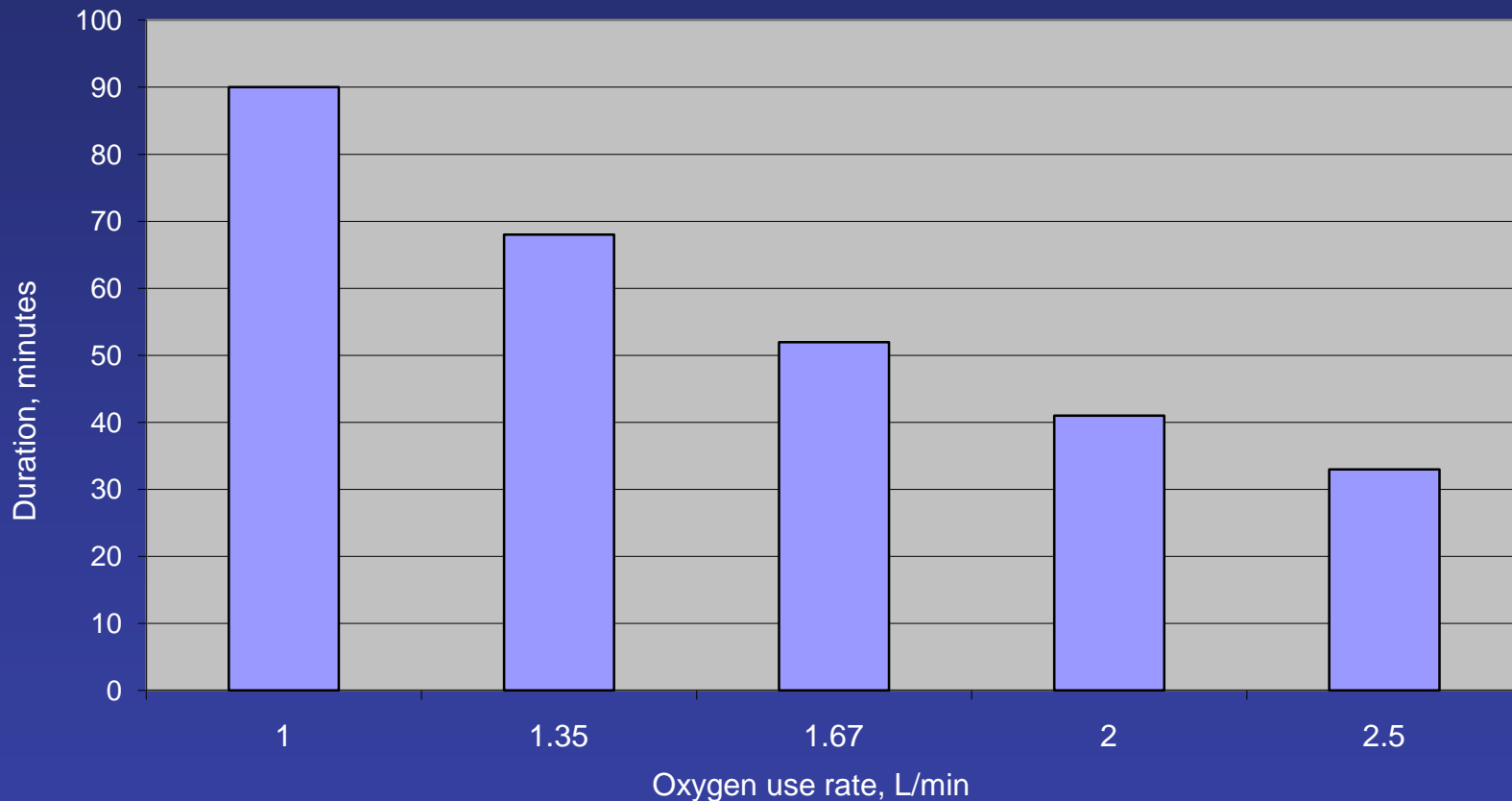


# First Concept

- SCSRs contain a certain quantity of oxygen. If you use it up faster, it won't last as long.
- They do not operate on a timer

# Duration vs. oxygen use rate

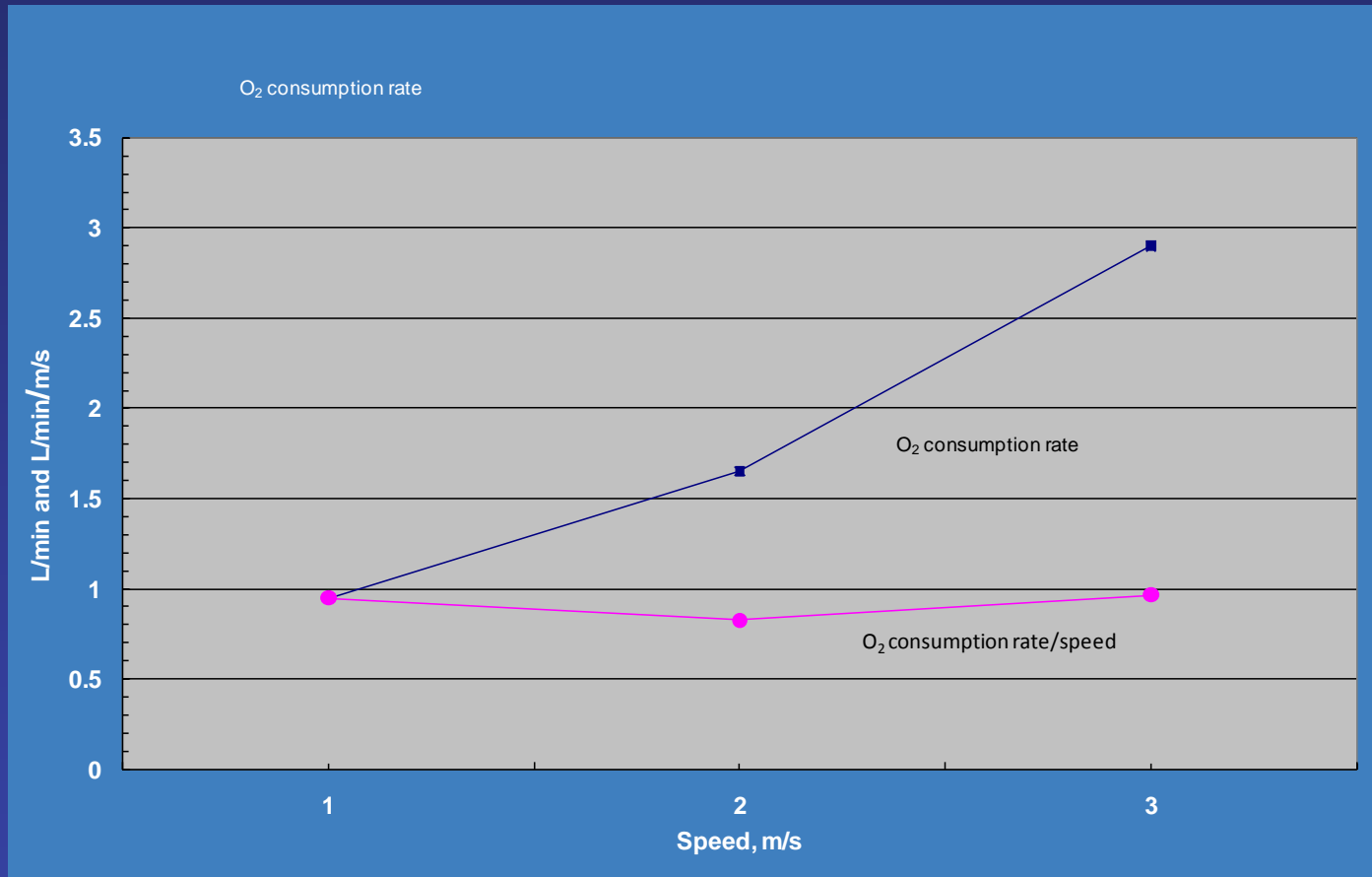
Figure 1  
Duration vs. oxygen use rate



# Second Concept

- **Cars have gas mileage; humans have oxygen mileage**
- **If you put a gallon of gas in a car, it can travel a certain distance. If you give a man a liter of oxygen, he can also travel a certain distance. Speed has little effect on travel distance in both cases.**

# $O_2$ consumption and $O_2$ consumption / speed



# Third Concept

- Just as a gallon of gas will take a smaller car further than a larger car, the lighter you are, the further your SCSR will take you

# Gas mileage and gas usage for Large Car versus Small Car

- **20 miles/gallon**

**or**

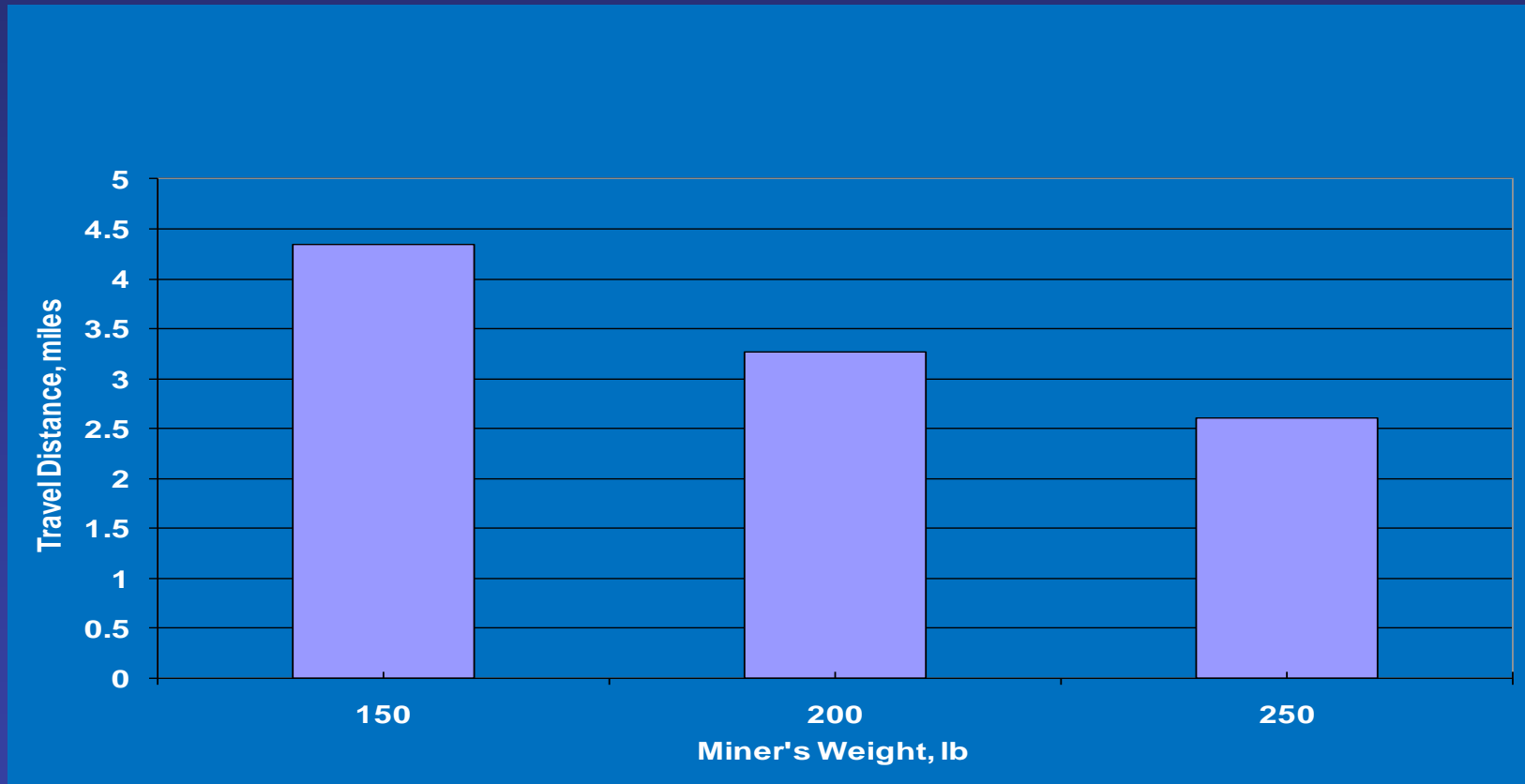
- **0.050 gallon/mile**

**40 miles/gallon**

**or**

**.025 gallon/mile**

# Possible travel distance vs. User's weight upright, level walking, flat ground, 100 L of oxygen

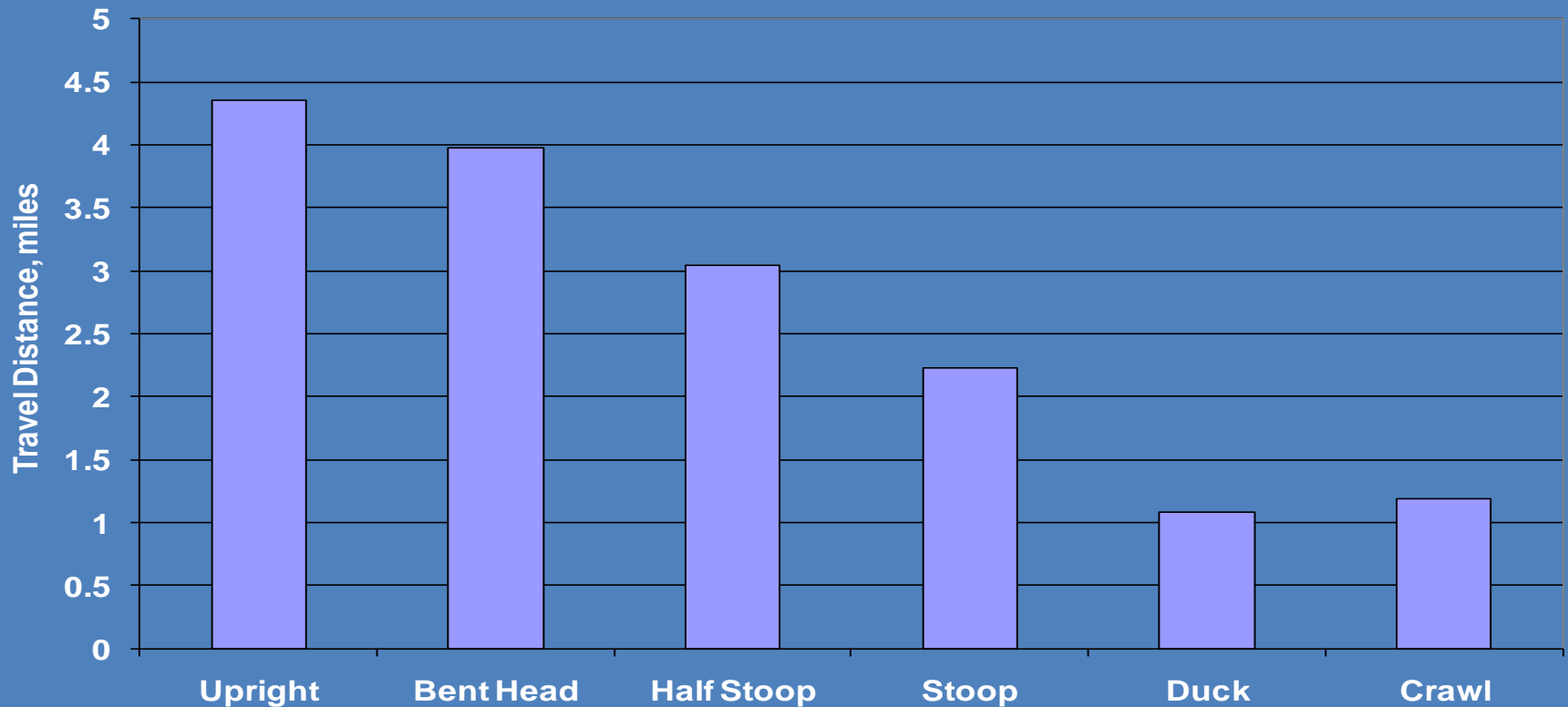


# Fourth Concept

- **Body posture affects your attainable distance**
- **Upright walking is the most efficient position and will take you the furthest distance**



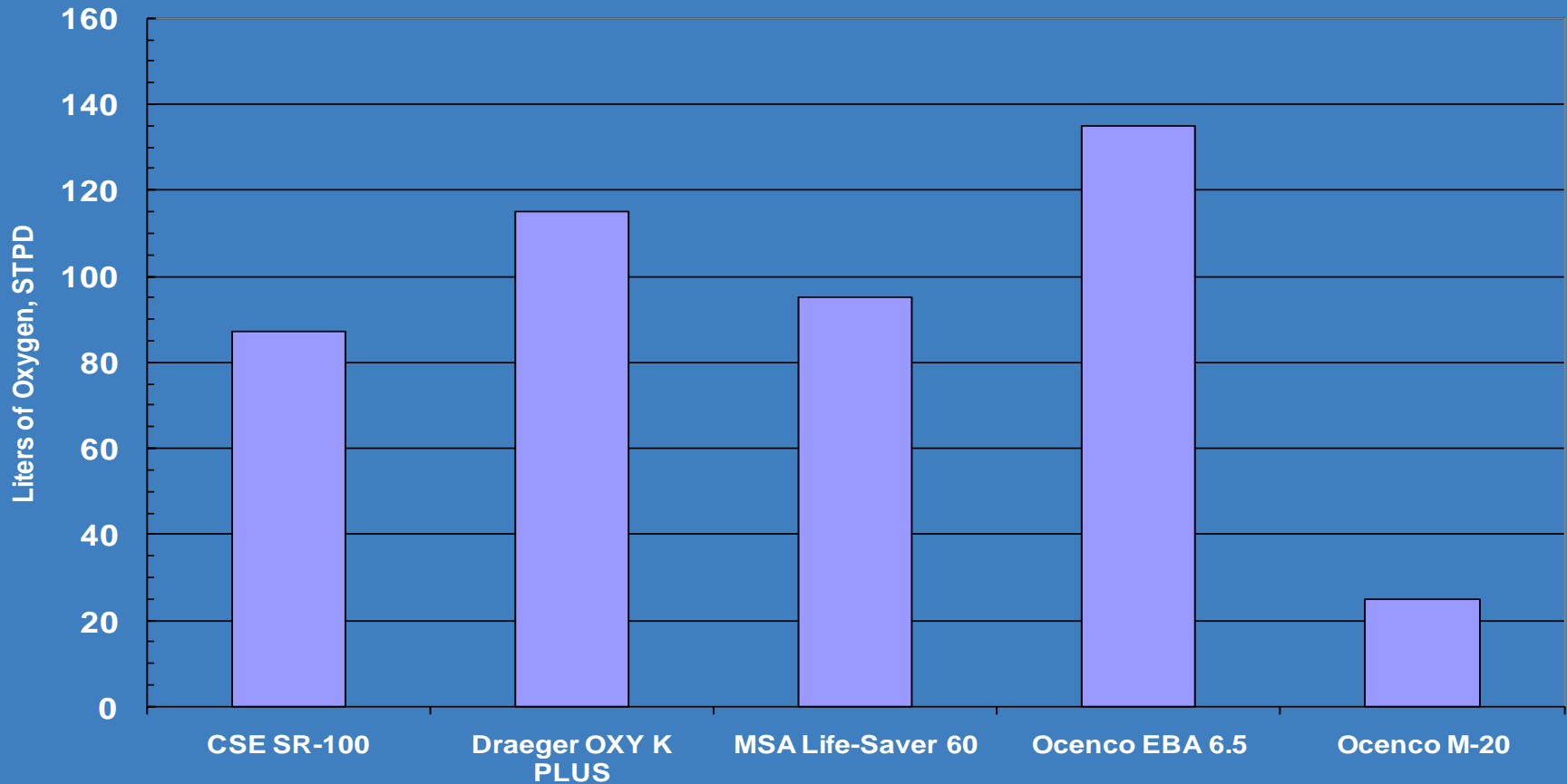
# Possible travel distance vs. posture for 150 pound man with 100 L of oxygen



# Fifth Concept

- Different models of apparatus contain different quantities of oxygen

# Quantity of Usable Oxygen



# Quality Partnerships Enhance Worker Safety & Health

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